

AVOID COSTLY MISTAKES!

What You Need to Know BEFORE You Finish Your Basement



*A Guide For Today's
Insulating Challenges*

Investing Responsibly In Insulation

Will doubling the insulation double my savings?

Insulating your basement is one of the best investments you can make in your home. The payback can be as little as 4.4 years.

US Department of Energy

Annual Savings with Basement Wall Insulation			
Average 1,500 S.F. Basement Minneapolis, MN	Annual Savings	Investment Payback	Return on Investment
R-10 Insulation	\$400	4.4 yrs	22.7%
An Additional R-10	\$50	35.2 yrs	2.8%

The US Department of Energy funded a study on insulation and found that **over-insulating your basement can be costly with little to no payback**. Adding an additional R-10 of insulation to the basement walls may take over 35 years to payback the initial investment. [DOE Basement Insulation102002-0776 Page 1](#)

How much heat loss is in an un-insulated basement?

The US Department of Energy funded another study of over 1,200 homes with the Building Science Consortium which found that ,

“Heat loss from an un-insulated basement can account for up to one third of the heating cost in an average home.”

There are many factors which effect this, one being the amount of exposed basement walls above grade.

“Insulating the upper half of the basement wall with R-5 insulation reduces the heat loss from the basement by approximately 50 percent.

Full height insulation (R-5) in the same area reduces heat loss from the basement by approximately 70 percent.”

This shows that insulating a basement is a cost effective step in saving energy costs.

[Basement Insulation Systems Page 5](#)



A bare concrete wall is like a huge single pane glass window.

Single pane glass window R .91
12" Concrete Wall R .96

[Colorado Department of Energy](#)

What You Need to Know About Mold

What conditions are necessary for mold to grow?

Basements are notorious for problems with water intrusion, cold temperatures, humidity, mold, and uncomfortable, if not unhealthy living conditions.

“Mold needs water to grow; without water mold cannot grow. Mold also needs food, oxygen and a temperature between 40 degrees and 100 degrees F. Since

mold decomposes dead organic (once living) material, it can grow on wood, the paper facing on gypsum board (drywall) and other materials made from wood. Molds secrete digestive fluids that decompose the substrate, making nutrients available.”

Some people ask why mold can grow on concrete

surfaces like basement walls. *“While mold cannot get nutrients from inorganic material such as concrete, glass and metal, it can grow on the dirt or dust present on these surfaces. Molds prefer damp or wet material.”*

It doesn't take long for mold to start growing. *“Mold spores begin to grow 24-48 hours after a water leak. Dry the house quickly and mold will not be a problem.”*

[What You Need To Know About Mold Pages 1 & 2](#)

Why does the lack of insulation on basement walls lead to mold and mildew problems?

When you pull an ice-cold drink out of a foam cooler on a humid summer day, you will notice condensation forming almost immediately on the sides of the can. This is the same thing that happens to the cold walls of a basement. As the walls become damp, they attract dust from the air. This dust is the food needed for mold to start growing. If you put the same insulation from the foam cooler on the basement wall, the condensation is stopped.

How do I remove mold?

When you are getting ready to finish your basement, you want to make sure to get as much of the mold removed as possible. *“Scrub the moldy area with soapy water, rinse thoroughly and allow to dry.”*

Another consideration is where the water came from in the first place. Before you cover up the concrete walls, you need to make sure that you have corrected the water intrusion problem first.



[What You Need To Know About Mold Page 2](#)

Basement Insulation Systems

Why are so many walls failing?

The Building Science Consortium constructed homes with varying insulation options to evaluate the insulation performance when meeting the Energy Star rating requirements.

“The approaches used early in the program were interior stud wall framing insulated with fiberglass batts and blanket insulation. These two approaches are the most common approaches to basement insulation used by the home building industry in general.”

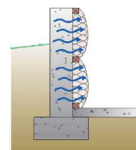


*“The experience by the Building Science Consortium with these two approaches has been bad. **Continued use of these approaches by the home building industry will likely lead to a disaster of unprecedented proportions and may result in the construction of energy efficient homes being set back a generation.”***

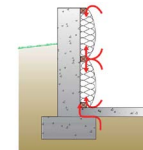
[Basement Insulation Systems Pages 1 & 2](#)

How does water get into a wall?

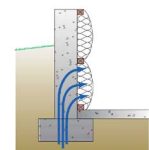
There are five causes for moisture entering wall systems: moisture of construction, air leakage, capillary rise from footings, diffusion (moisture from the air), and ground water leakage. *“The problem associated with interior stud wall framing insulated with fiberglass batts and blanket insulation is due to the accumulation of moisture within the insulated frame wall located on the interior of the basement foundation or within the blanket insulation located on the interior of the basement foundation wall. This moisture leads to mold, decay and odors.”* [Basement Insulation Systems Page 3](#)



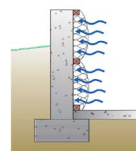
Moisture of Construction



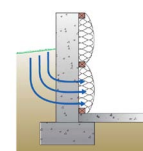
Air Leakage



Capillary Rise



Diffusion



Groundwater

Why can MORE insulation mean MORE mold problems?

“Evaporation requires energy but insulation decreases the flow of energy. Insulated walls cannot dry as easily as un-insulated walls.”

The more insulation you add to a basement wall system, the more critical it is to pick materials that won't rust, rot, or decay. [Basement Insulation Systems Page 5](#)

What are the key properties needed for basement insulation?

“Any interior basement insulating wall system must have the following properties: It must be able to dry to the interior should it become wet since the below grade portion of the wall will not be able to dry to the exterior during any time of the year.”

“The wall assembly must prevent any significant volume of interior air from reaching the cool foundation wall. Thus it must have an effective interior air barrier or a method of elevating the temperature of potential condensing surfaces (such as rigid insulation installed directly on the interior of concrete or masonry surfaces).”

Materials in contact with the foundation wall and the concrete slab must be moisture tolerant; that is the

materials should not support mold growth or deteriorate if they become wet.” [Basement Insulation Systems Page 10](#)

What are the best wall systems?

The Building Science Consortium has reached the conclusion that **“basement interior insulation strategies involve placement of a layer of rigid foam insulation against the foundation wall.”**

[Basement Insulation Systems Page 4](#)

“(Closed-cell) expanded polystyrene is semi-permeable to water vapor and will allow the lower portion of the wall to continue to dry inwards.”

[Basement Insulation Systems Page 12](#)

Do I need a vapor barrier?

The use of vapor barriers with wood framed walls below grade is not considered a good building practice. If you have a vapor barrier with a wood framed wall that is built against a concrete foundation wall, moisture problems are inevitable. If the wall gets wet for any reason, it cannot dry to the interior because of the vapor barrier. The wall cannot dry to the exterior through the waterproofing to the wet subsoil. The laws of physics say moisture flows from wet surfaces to dry surfaces.

[Basement Insulation Systems Page 15](#)

Products to Consider for Basement Finishing

Should I seal my concrete walls or floors?

If you have a water issue, this is your last chance to fix the problem before it is covered up.

There are two different types of concrete sealer. The first is a penetrating sealer which soaks into the concrete up to two inches. It reacts with the lime to form a crystalline glass-like water proofing. This type of product can only be used on unpainted concrete surfaces. The second type of concrete sealer is a paint on type which is only as good as the bond to the wall. The two methods can be combined together to achieve an even higher level of protection.

[Peneseal](#)

[Drylok](#)

When should I use a perimeter drainage system?

When you have water coming out between the floor and wall joint or when the concrete cores of a block foundation fill with water (the lower blocks look wet), then a perimeter drainage system may be good option. [Journal of Light Construction](#)

What is mold resistant drywall?

There are many types of mold resistant drywall that have an enhanced mold resistant core as well as mold resistant paper. There is also paperless drywall with a mold resistant fiberglass matt coating.

[Fine Homebuilding](#)

What is the best way to insulate and seal the rim joist?

“Stuffing fiberglass batts between the floor joists is a common method of insulating the rim joist in many homes, but it’s a severely flawed technique...the insulation cannot perform at its full-rated R-value because air and moisture can move freely in and out of the building.” Spray foam insulation is a good replacement. You can also use rigid insulation along with spray foam insulation for a more cost effective method. [Fine Homebuilding](#)



Radon & Soil Gases

How do I guard against radon problems?

Use a penetrating radon sealer on bare concrete walls and floors. Seal any cracks in the concrete and around any penetrations. [DOE Basement Insulation Page 1](#)

Exterior Grade & Water Management

What should I look at outside my house?

You should always check the grade around your house if you have water issues in your basement. Up to 80% of water issues in a basement can be fixed with proper grading and gutters/downspouts.

How do I fix my exterior grade?

You can add a heavy EPDM rubber roofing membrane or pond line to direct water away from the foundation. This is particularly helpful if your soil is sandy.

[University of MN Extension Service](#)

InSoFast Panels for Basement Finishing



InSoFast Panels are the ideal insulating and framing material for basement finishing. The InSoFast Panels offer the answers to all the questions when finishing a basement.

- » **Co-polymer Plastic Wall Studs will not Rot or Decay**
- » **Fully Insulated Studs**
- » **Closed-cell Insulation**
- » **Ventilated Air Channels allow moisture to evaporate**
- » **Wiring Chase Network**
- » **Solid Backing for Drywall**

[See InSoFast.com for all the details](#)

InSoFast Outperforms Conventional Wall Systems

A Wall System built with InSoFast Panels will outperform A Framed Wall with R-13 Fiberglass Insulation in 17 categories!

	Framed Walls	InSoFast Wall System
Wall System Description	A concrete wall along with a 2x4 wall framed at 16" o.c. installed with R-13 fiberglass insulation as well as a vapor barrier that is often used to keep moisture from reaching the drywall.	InSoFast panels installed against a concrete wall with a drywall finish.
Actual Thermal Performance of Wall System	R-Value of 10.22	R-Value of 11.08
Thermal Breaks	Each stud location represents a thermal short circuit in the insulating barrier, allowing moisture-filled air to pass. When wood 2x4 framing is used, 15 - 25% of the wall surface is comprised of 2x4 framing that is R-4.	InSoFast Panels are manufactured with fully insulated studs which eliminate thermal breaks. Inter-locking flanges create a tight seal at each panel connection.
Moisture Effect on R-Value	Fiberglass can lose as much as 80% of its R-value when exposed to even low moisture levels, which are common below grade. Moisture leads to wood decay.	When exposed to moisture, the R-value of InSoFast Panels remains constant and will shed liquid water.
Permeability	Frame walls built with vapor barriers are impermeable, trapping moisture inside the wall cavity where moisture can lead to mold and decay.	InSoFast Panels are vapor semipermeable and do not inhibit the wall's ability to dry.
Temperature Effect	Fiberglass insulation loses as much as 40% of its insulating capacity when temperatures fall below 20°F and over half its R-value below 0°F.	The thermal performance of InSoFast Panels is not degraded by changes in temperature. In fact, studies have shown R-values to improve as temperatures decrease.
Compression Effect	Fiberglass must be fully expanded to work properly. If it is stuffed into openings or compressed by plumbing or electrical wires, it loses most of its R-value.	Wires are easily installed into pre-formed channels in the InSoFast panel.
Mold and Mildew	Organic wood studs absorb moisture and support mold growth. Fiberglass insulation also absorbs moisture and promotes mold growth.	InSoFast panels do not promote mold growth. Semi-permeable panels allow moisture to dry inward as recommended by the Building Science Consortium.
Off-gassing Indoor Air Quality	Wood building materials and fiberglass insulation are often treated with preservatives and formaldehyde. Mold and airborne toxins contaminate the indoor air quality.	InSoFast panels manufactured with no ozone depleting CFCs or HCFCs. No toxins or formaldehyde is produced. The InSoFast panels are inert and experience no physical or chemical breakdown over time.

Strength & Stability	Wood frame construction exceeds strength requirements but degrades over time. Wood framing members warp and twist as moisture levels vary. Nail "pops" are common.	InSoFast panels are stable and unaffected by moisture variances. Adhered panels exceed a 2,000# pullout test. Polypropylene studs provide a stable surface with superior holding power and eliminating nail pops.
Water Absorption of Insulation	Fiberglass insulation can hold many times its weight in water. Water damaged fiberglass insulation must be removed and replaced.	The maximum adsorption by total immersion is less than 3% moisture content for the InSoFast panel. ASTM:D6817
Water Absorption of Framing Members	The standard moisture content for above grade wood framed wall is 10 - 15%. By adding just 5% more moisture, such as in a basement installation, mold will grow.	The InSoFast stud is a plastic product and will not absorb water or rot away.
Vapor Control	Basement walls must be able to dry. For walls built below grade, drying typically means towards the interior. Adding vapor barriers to control the moisture actually keeps the moisture from being able to dry properly. If placed directly against the masonry wall, an impermeable barrier keeps moisture from being able to dry towards the interior. If installed over the wood framing, moisture is trapped inside the wall cavity causing wood to rot and mold to grow.	InSoFast Panels are a Type III Vapor Retarder and are inherently mold resistant. This type of semi-permeable foam is the perfect insulating material for basements. Moisture is able to dry inward as recommended by the Building Science Consortium.
Installing Insulation	The performance of the thermal barrier is dependent in part upon the quality of workmanship. For fiberglass insulation to work effectively, it must be in continuous contact with its surrounding surfaces on all six sides. It is virtually impossible for installers to achieve this on a job site. Even the smallest gap allows air circulation which kills the insulation value.	InSoFast Panels are installed in a consistent manner with no gaps. Tongue & groove connections and alignment notches make installations fool-proof. Thermal performance is consistent.
Space Savings	The current standard of frame construction with ½" drywall and a 1" air gap requires 5". The air gap is an attempt to keep the fiberglass from coming in direct contact with the concrete surface.	With InSoFast, every room will be larger. The panel is 2" thick including the built-in ventilated air channels that allow moisture to evaporate.
Environmental Impact	Wood framing members are produced from trees and treated with preservatives. Fiberglass insulation is often produced with formaldehyde.	No trees are harvested leaving them to absorb CO2. InSoFast panels require 25% less energy to produce than fiberglass insulation. The InSoFast studs are made from 100% recycled material.
Durability - Service Life	Wood frame walls attract moisture, mold, and insects which eventually leads to wood rot and deterioration.	InSoFast Panels are not susceptible to moisture, insects, or mold and provide a long service life.